
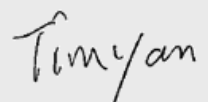


Test report No: 4931349.50

TEST REPORT

Radio Spectrum Matters (RF)

Identification of item tested	Bluetooth & 2.4G WIFI communication Module
Trademark	N/A
Model and /or type reference	MWB-S-F13, MWB-S-F13A
FCC ID	2ADQOMWB-S-F13
Features	5 Vdc, 0.5A
Applicant's name / address	GD Midea Air-Conditioning Equipment Co.,Ltd. Lingang Road, Beijiao, Shunde , Foshan, Guangdong, PEOPLE'S REPUBLIC OF CHINA
Test method requested, standard	FCC CFR Title 47 Part15 Subpart C Section 15.247; KDB558074 D01v05r02;
Verdict Summary	COMPLIANCE
Tested by (name & signature)	Jazz Liang 
Approved by (name & signature)	Tim Yan 
Date of issue	2025-02-14
Report template No	TRF_EMC 2017-06- FCC_Part15C_247

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GENERAL CONDITIONS

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.
5. This report will not be used for social proof function in China market.

UNCERTAINTY

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in EN 55016-4-2 (CISPR 16-4-2), EN/IEC 61000-4 series or a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not tested	N/T

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

<input checked="" type="checkbox"/> Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
<input type="checkbox"/> Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	<input checked="" type="checkbox"/>	Comma (,)	<input type="checkbox"/> Point (.)

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
U_N	: Nominal voltage
Tx	: Transmitter
Rx	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

DOCUMENT HISTORY

Report nr.	Date	Description
4931349.50	2025-02-14	First release.

REMARKS AND COMMENTS

The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item	Bluetooth & 2.4G WIFI communication Module
Trademark	N/A
Model / Type number	MWB-S-F13, MWB-S-F13A
FCC ID	2ADQOMWB-S-F13
Hardware	N/A
Software	N/A
Firmware	N/A
Ratings	5 Vdc, 0.5A
Manufacturer.....	GD Midea Air-Conditioning Equipment Co.,Ltd. Lingang Road, Beijiao, Shunde , Foshan, Guangdong, PEOPLE'S REPUBLIC OF CHINA
Factory	GD Midea Air-Conditioning Equipment Co.,Ltd. Lingang Road, Beijiao, Shunde , Foshan, Guangdong, PEOPLE'S REPUBLIC OF CHINA

Based on customer description: Wireless module Characteristic

Operating frequency range(s) – Tx :	2412 – 2462 MHz for 2.4G WIFI 2402 – 2480 MHz for Bluetooth
Operating frequency range(s) – Rx :	2412 – 2462 MHz for 2.4G WIFI 2402 – 2480 MHz for Bluetooth
Type of Modulation	WLAN 2.4GHz : IEEE 802.11b: DSSS (CCK, QPSK, BPSK); IEEE 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM); IEEE 802.11n HT20: OFDM (BPSK, QPSK, 16QAM, 64QAM) Bluetooth LE:GFSK
Antenna type.....	Integrate antenna
Antenna gain.....	1.73 dBi
Operation temperature range	-20 – 85 °C

Antenna List

Antenna Model No.		N/A			
Antenna Manufacturer		N/A			
Antenna Delivery		<input checked="" type="checkbox"/> 1*TX+1*RX	<input type="checkbox"/> 2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX	
Antenna Technology		<input checked="" type="checkbox"/> SISO			
		<input type="checkbox"/> MIMO	<input type="checkbox"/> Basic methodology		
			<input type="checkbox"/> Sectorized antenna systems		
			<input type="checkbox"/> Cross-polarized antennas		
			<input type="checkbox"/> Unequal antenna gains, with equal transmit powers		
			<input type="checkbox"/> Spatial Multiplexing		
			<input type="checkbox"/> Cyclic Delay Diversity (CDD)		
Antenna Type		Integrate antenna			
Antenna Gain					
Antenna Technology		Ant Gain(eth1) (dBi)			
<input checked="" type="checkbox"/> SISO	<input checked="" type="checkbox"/> Ant1	1.73			
	<input type="checkbox"/> Ant2	-			

The radio module (Bluetooth) operating channels are:

BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454	-	-
13	2428	27	2456	-	-

The WIFI mode operating channels are:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	-	-
6	2437	-	-
7	2442	-	-

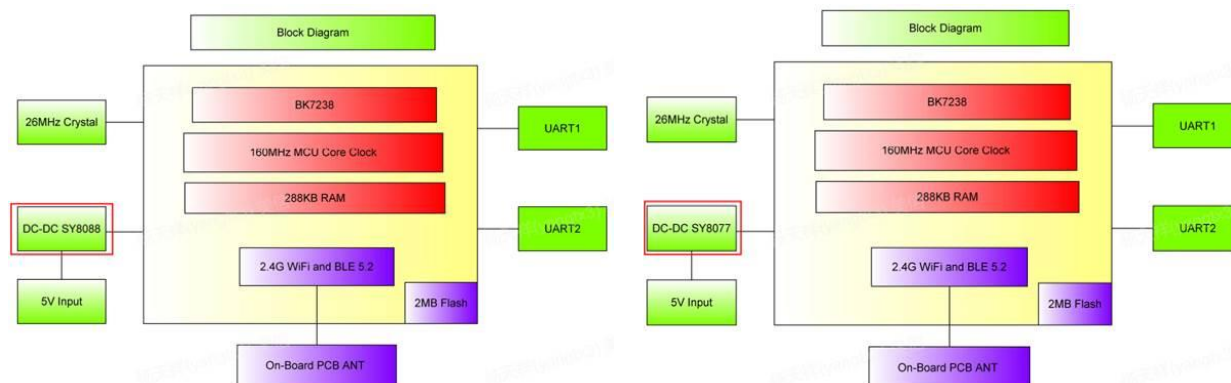
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	DC: 5 V					
Mounting position.....	<input type="checkbox"/> Battery:						
	<input type="checkbox"/> Table top equipment						
	<input type="checkbox"/> Wall/Ceiling mounted equipment						
	<input type="checkbox"/> Floor standing equipment						
	<input checked="" type="checkbox"/> Other: Installed on the circuit board						

Intended use of the Equipment Under Test (EUT)

The apparatus as supplied for the test is Wireless module.

According to customer description, models MWB-S-F13, MWB-S-F13A are identical in Appearance, color, schematic and structure, only the DC-DC component is different for all the models, Details as below:

MWB-S-F13 DC-DC model is 8088, MWB-S-F13A DC-DC model is 8077.



The function of both 8077 and 8088 in the circuit is to convert a 5V voltage to a 3.3V voltage. The only difference between the 8077 and 8088 is that the input voltage range is not the same.



Application Notes: AN_SY8088

High Efficiency 1.5MHz, 1A
Synchronous Step Down Regulator
Preliminary Specification

General Description

SY8088 is a high efficiency 1.5MHz synchronous step down DC/DC regulator IC capable of delivering up to 1A output current. It can operate over a wide input voltage range from 2.5V to 5.5V and integrate main switch and synchronous switch with very low $R_{DS(on)}$ to minimize the conduction loss.

Ordering Information

SY8088 □(□)□□
Temperature Code
Package Code
Optional Spec Code
Temperature Range: -40°C to 85°C

Ordering Number	Package Type	Note
SY8088AAC	SOT23-5	1A

Features

- Low $R_{DS(on)}$ for internal switches (top/bottom) 260mΩ/170mΩ
- **2.5-5.5V input voltage range**
- 40μA typical quiescent current
- High light load efficiency
- High switching frequency 1.5MHz minimizes the external components
- Internal soft-start limits the inrush current
- 100% dropout operation
- RoHS Compliant and Halogen Free
- Compact package: SOT23-5

Applications



Application Notes: AN_SY8077

High Efficiency 1.5MHz, 1A
Synchronous Step Down Regulator

General Description

SY8077 is a high efficiency 1.5MHz synchronous step down DC/DC regulator IC capable of delivering up to 1A output current. It can operate over a wide input voltage range from 2.5V to 6.5V and integrate main switch and synchronous switch with very low $R_{DS(on)}$ to minimize the conduction loss.

Ordering Information

SY8077 □(□)□□
Temperature Code
Package Code
Optional Spec Code

Ordering Number	Package Type	Note
SY8077AAC	SOT23-5	1A

Features

- Low $R_{DS(on)}$ for internal switches (top/bottom) 260mΩ/170mΩ
- **2.5-6.5V input voltage range**
- 40μA typical quiescent current
- High light load efficiency
- High switching frequency 1.5MHz minimizes the external components
- Internal soft-start limits the inrush current
- 100% dropout operation
- RoHS Compliant and Halogen Free
- Compact package: SOT23-5

Applications

Hence,model MWB-S-F13 were chosen for full test.

Copy of marking plate:

No provide.

1.2 Test data

Test Location	DEKRA Testing and Certification (Shanghai) Ltd. Block 5, No.3, Qiyun Road, Huangpu District, Guangzhou, Guangdong, China FCC Designation Number: CN1324;
Date of receipt of test item	2024-12-25
Date (s) of performance of tests	2024-12-25 to 2025-02-08
Test sample	Normal sample: MWB-S-F13(Lab no.4931349-1), RF conducted sample: MWB-S-F13(Lab no.4931349-2), RF radiated sample: MWB-S-F13(Lab no.4931349-1)

1.3 The environment(s) in which the EUT is intended to be used

The equipment under test (EUT) is intended to be used in the following environment(s):

<input checked="" type="checkbox"/>	Residential (domestic) environment.
<input checked="" type="checkbox"/>	Commercial and light-industrial environment.
<input type="checkbox"/>	Industrial environment.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description	Used for methods	
		Conducted	Radiated
1	Transmitting at 1 Mbit/s,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2			
3			
4			
Supplemental information: ---			

2.2 Support / Auxiliary equipment / unit / software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
Laptop	Latitude 5488	DELL	DEKRA
Serial port tool	-	-	Client
Wifi_Test_Tool	V1.9.0m	-	Client
Supplemental information: ---			

2.3 Test Configuration / Block diagram used for tests

Refer to Annex 3.

2.4 Measurement procedure

The EUT was controlled by a serial PCB(Serial port tool) which provided by manufacturer which connected to laptop through the com port. After connected, run the software "Wifi Test Tool V1.9.0m" supplied by manufacturer to control the EUT work in required test mode as below table.

RF Mode	Set_channel(MHz)	Set_power in software
BLE_1M	2402	auto
	2440	auto
	2480	auto

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C Section 15.247	2022	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
KDB 558074 D01 v05r02	2019	Guidance for performing compliance measurements on Digital Transmission System (DTS) operating under section 15.247
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

3.3 Overview of results

FCC measurement			
Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	FCC 15.207	N/A	See 1)
Emissions in non-restricted frequency bands	FCC 15.247(d), FCC 15.209	PASS	---
Emissions in restricted frequency bands	FCC 15.247(d), FCC 15.209	PASS	---
Duty cycle	ANSI C63.10:2013	PASS	---
Band Edge	FCC 15.247(d)	PASS	---
Fundamental emission output power	FCC 15.247(b)(3)	PASS	---
DTS Bandwidth	FCC 15.247(a)(2)	PASS	---
Power Spectral Density	FCC 15.247(e)	PASS	---
Antenna Requirement	FCC 15.203	PASS	---
<u>Supplementary information:</u>			
1) The EUT is module which is built-in used.			

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to calculate the uncertainty associated with the measurement result.

4 TRANSMITTER TEST RESULTS

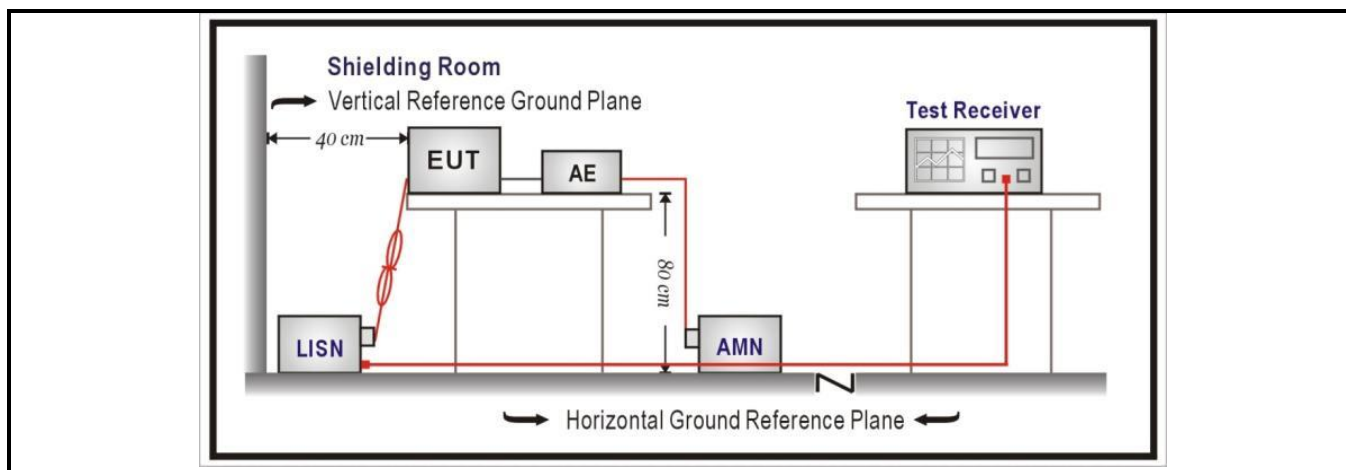
4.1 AC Power Line Conducted Emission	VERDICT: N/A
---	---------------------

Limits

FCC Part 15 Subpart C Paragraph 15.207				
Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾	Limit: AV [dB(μV) ¹⁾	IF BW	Detector(s)
0,15 - 0,50	66 - 56 ²⁾	56 - 46 ²⁾	9 KHz	QP, AV
0,50 - 5,0	56	46	9 KHz	QP, AV
5,0 - 30	60	50	9 KHz	QP, AV

¹⁾ At the transition frequency, the lower limit applies.
²⁾ The limit decreases linearly with the logarithm of the frequency.

Test Configuration



Performed measurements

Port under test		Terminal							
<input type="checkbox"/>	AC mains input power	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>	L1	<input type="checkbox"/>	L2	<input type="checkbox"/>	L3
<input type="checkbox"/>	DC input power	<input type="checkbox"/>	Positive (+)			<input type="checkbox"/>	Negative (-)		
Test method applied	<input type="checkbox"/>	Artificial mains network							
	<input type="checkbox"/>	Voltage probe							
Test setup	<input type="checkbox"/>	Table top	<input type="checkbox"/>	Artificial hand applied					
	<input type="checkbox"/>	Floor standing	<input type="checkbox"/>	Other:					
	Refer to the Annex 2 for test setup photo(s).								
Operating mode(s) used		Mode 1							
Envirment condition (temperature; humidity)		23,0 °C; 45,0 %							
Remark		---							

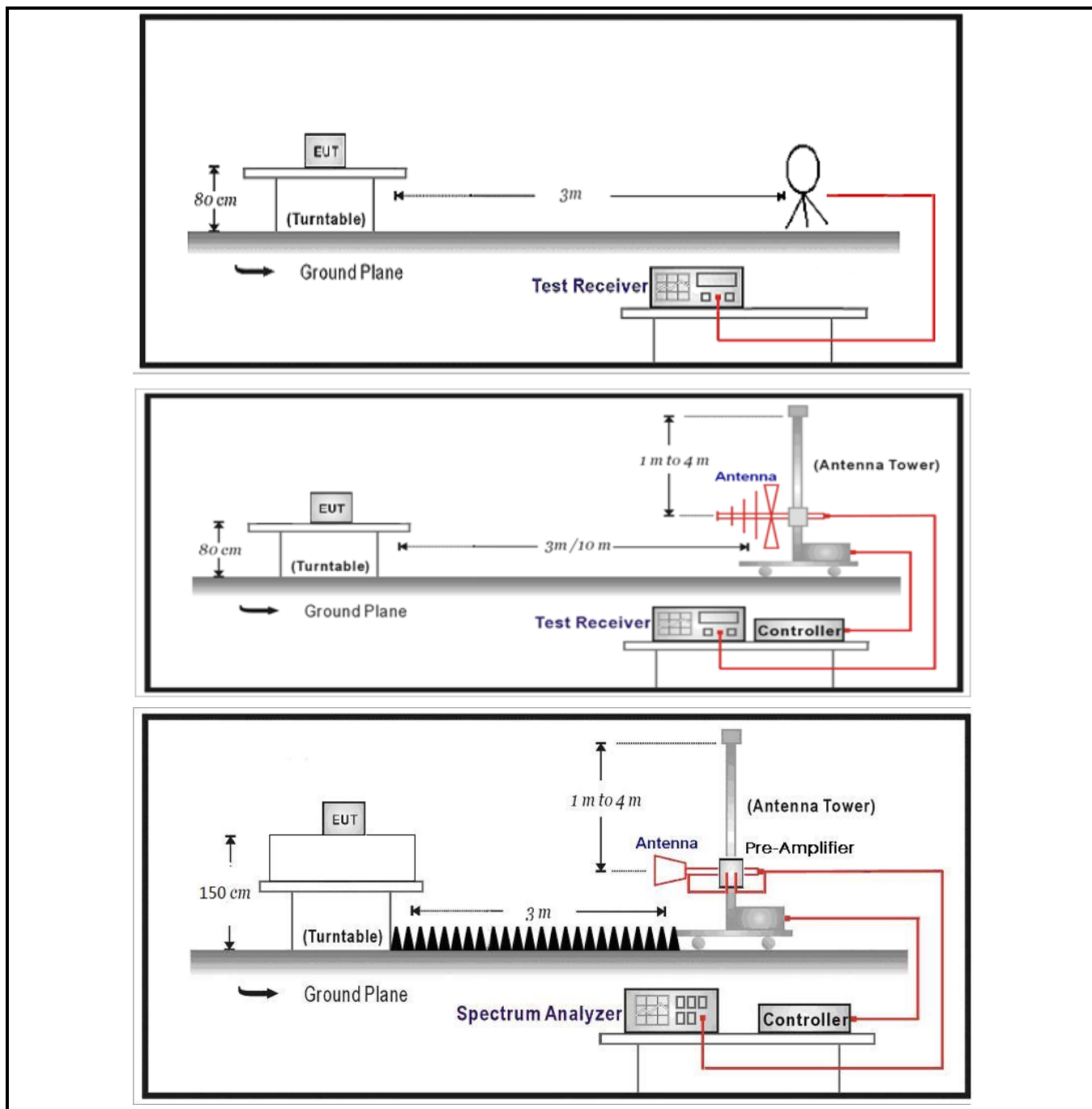
4.2	Emissions in non-restricted frequency bands	VERDICT: PASS
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Emissions Limit 15.209(a)			
Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

Test Configuration



Performed measurements

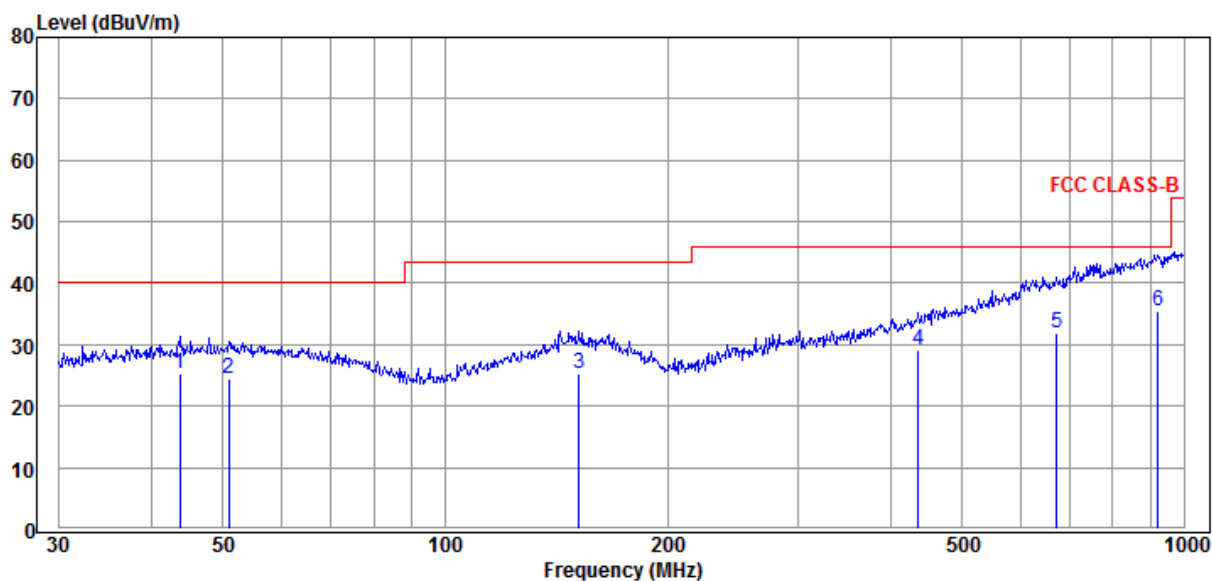
Port under test	Enclosure port	
Test method applied	<input type="checkbox"/>	Conducted measurement
	<input checked="" type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	<p>1)The test frequency range, 9kHz~30MHz, 18GHz~26GHz, both of the worst case are at least 20dB below the limits, therefore no data appear in the report.</p> <p>2)The EUT are tested in three orientations. The record is the worst orientation which refer to the Annex 3 for test setup photo(s).</p>	

Results of 30 – 1000 MHz

Model	MWB-S-F13
Operation Mode	Mode 1 @2402MHz (worst case)
Test voltage	5 Vdc

Results

Horizontal



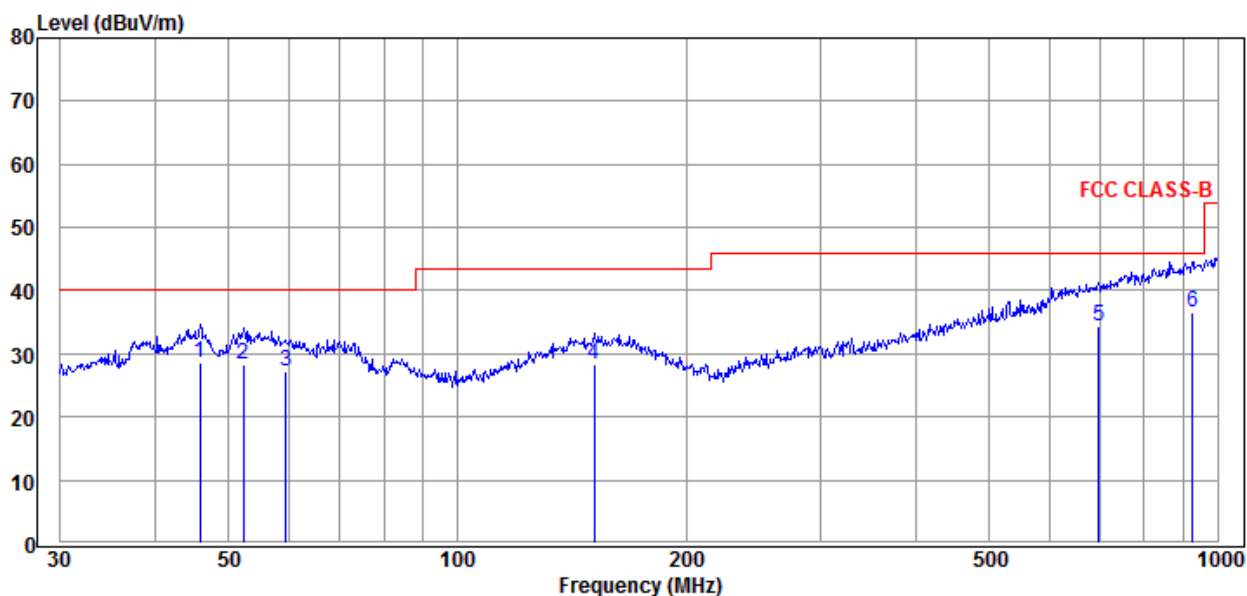
Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
43.66	5.07	20.26	25.33	40.00	14.67
50.94	3.85	20.56	24.41	40.00	15.59
151.60	4.22	20.94	25.16	43.50	18.34
437.12	3.89	25.35	29.24	46.00	16.76
672.84	1.81	30.08	31.89	46.00	14.11
922.52	1.70	33.86	35.56	46.00	10.44

Remarks:

- 1) C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
- 2) Result = Reading + C.F (Correction Factor)

No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Vertical



Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
45.86	8.28	20.42	28.70	40.00	11.30
52.21	7.66	20.52	28.18	40.00	11.82
59.44	7.18	20.07	27.25	40.00	12.75
151.07	7.34	20.92	28.26	43.50	15.24
696.86	3.77	30.53	34.30	46.00	11.70
925.76	2.60	33.90	36.50	46.00	9.50

Remarks:

- 1) C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
- 2) Result = Reading + C.F (Correction Factor)

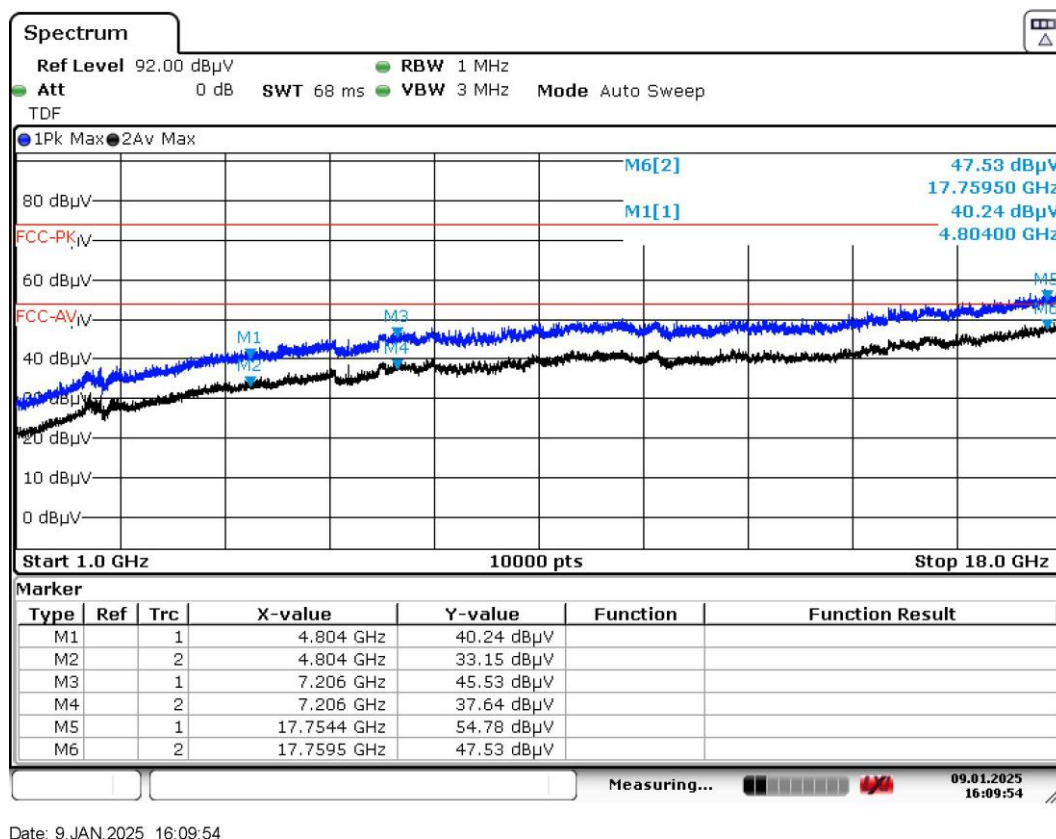
No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Results of 1 – 18 GHz

Model	MWB-S-F13
Operation Mode (worst case)	Mode 1 @2402 MHz
Test voltage	5 Vdc

Results

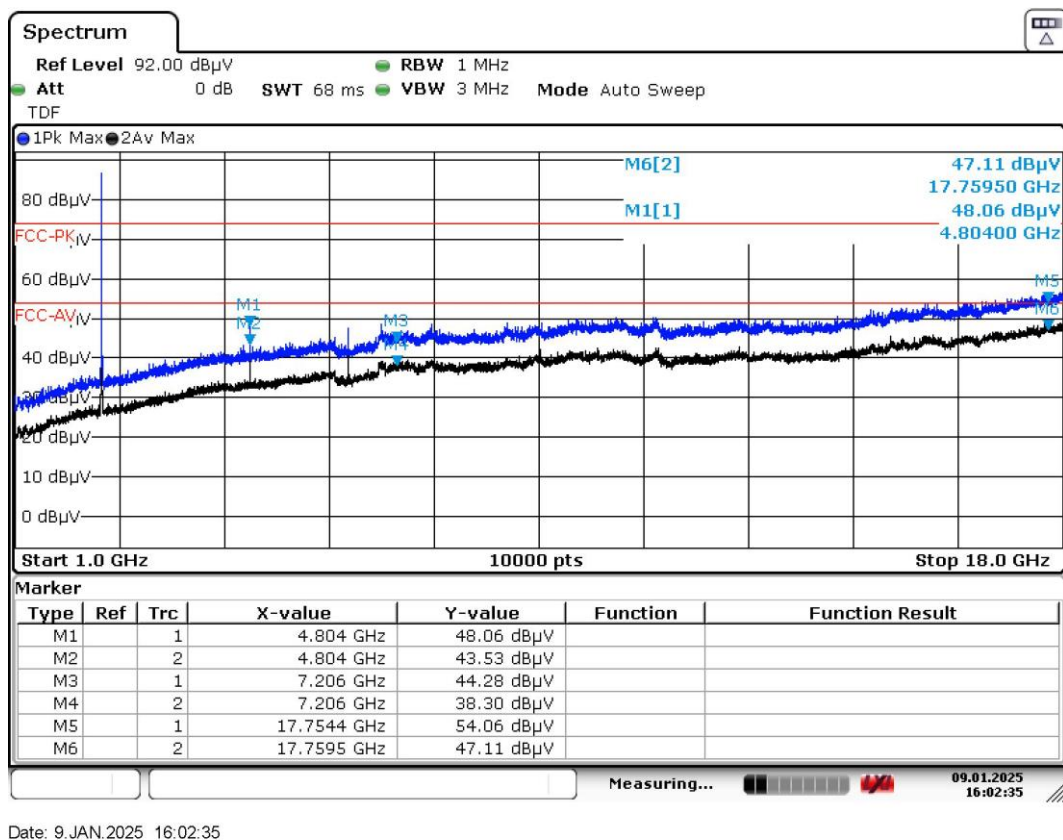
Horizontal



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



Date: 9.JAN.2025 16:02:35

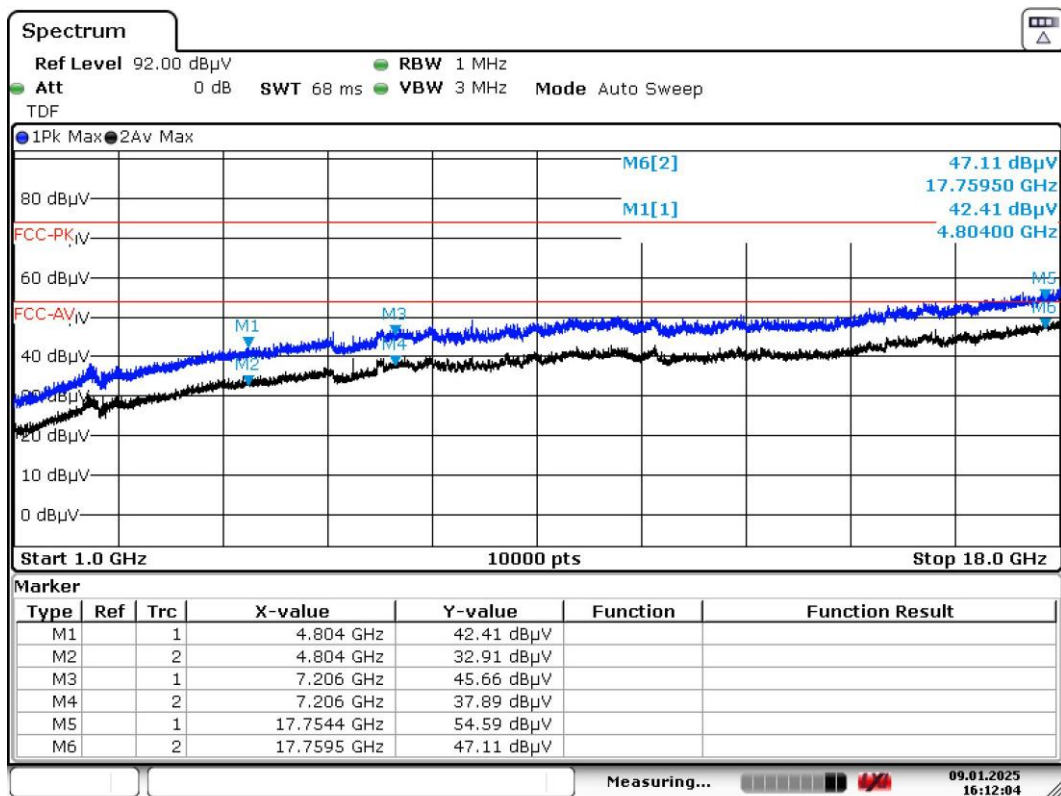
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Model	MWB-S-F13
Operation Mode (worst case)	Mode 1 @2440 MHz
Test voltage	5 Vdc

Results

Horizontal

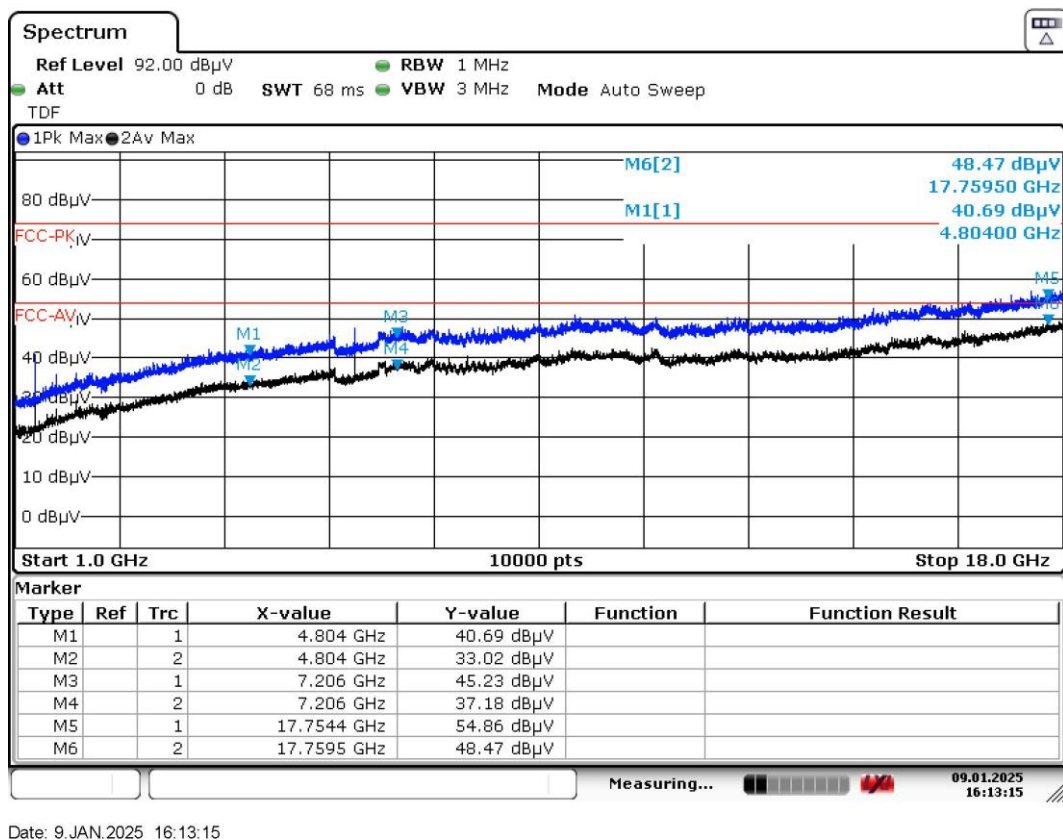


Date: 9.JAN.2025 16:12:04

Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



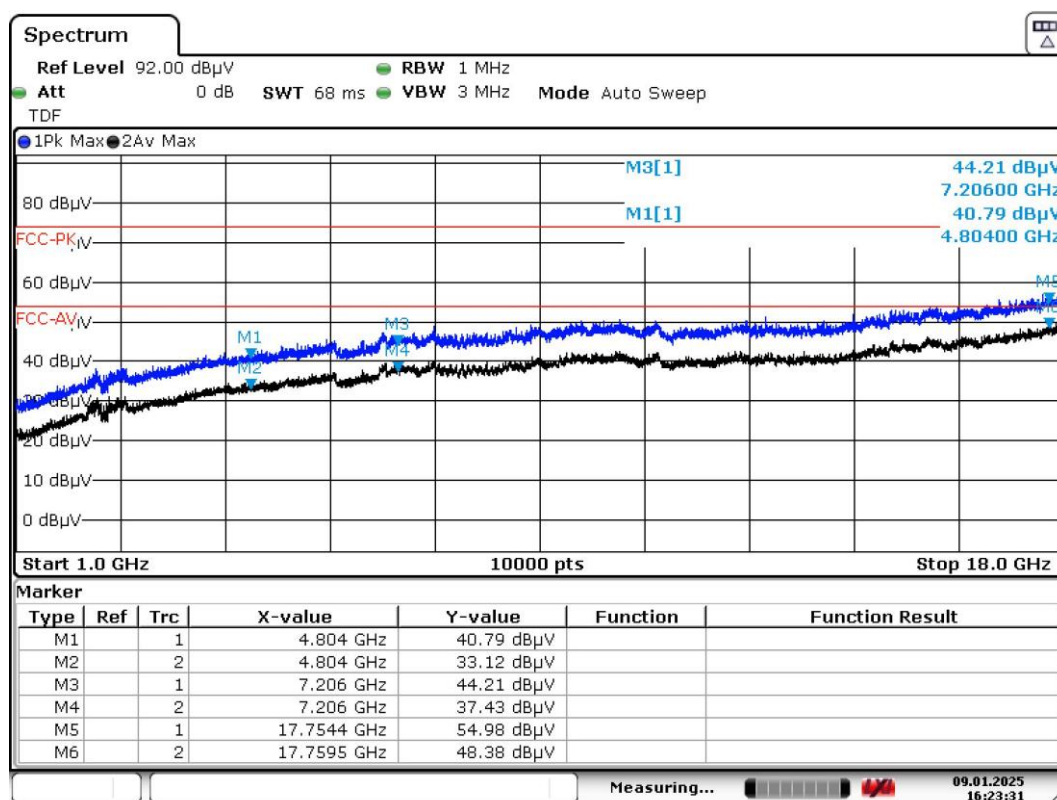
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Model	MWB-S-F13
Operation Mode (worst case)	Mode 1 @2480 MHz
Test voltage	5 Vdc

Results

Horizontal

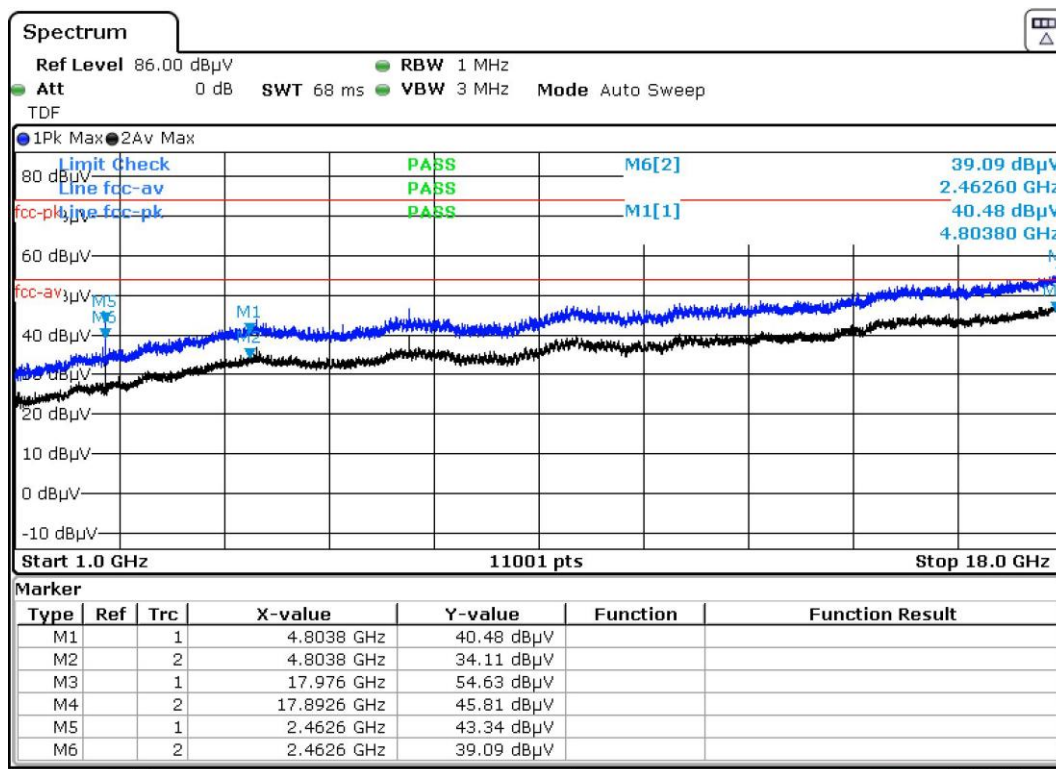


Date: 9.JAN.2025 16:23:31

Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

4.3	Emissions in restricted frequency bands	VERDICT: PASS
------------	--	----------------------

Restricted Bands of operation of FCC			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.81425 – 8.81475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	
156 – 13.41			
Restricted Bands of operation for IC			
0.090 - 0.110	156 - 13.41	960 - 1427	9.0 - 9.2
0.495 - 0.505	16.42 - 16.423	1435 - 1626.5	9.3 - 9.5
2.1735 - 2.1905	16.69475 - 16.69525	1645.5 - 1646.5	10.6 - 12.7
3.020 - 3.026	16.80425 - 16.80475	1660 - 1710	13.25 - 13.4
4.125 - 4.128	25.5 - 25.67	1718.8 - 1722.2	14.47 - 14.5
4.17725 - 4.17775	37.5 - 38.25	2200 - 2300	15.35 - 16.2
4.20725 - 4.20775	73 - 74.6	2310 - 2390	17.7 - 21.4
5.677 - 5.683	74.8 - 75.2	2483.5 - 2500	22.01 - 23.12
6.215 - 6.218	108 - 138	2655 - 2900	23.6 - 24.0
6.26775 - 6.26825	149.9 - 150.05	3260 - 3267	31.2 - 31.8
6.31175 - 6.31225	156.52475 - 156.52525	3332 - 3339	36.43 - 36.5
8.291 - 8.294	156.7 - 156.9	3345.8 - 3358	Above 38.6
8.362 - 8.366	162.0125 - 167.17	3500 - 4400	
8.37625 - 8.38675	167.72 - 173.2	4500 - 5150	
8.41425 - 8.41475	240 - 285	5350 - 5460	
12.29 - 12.293	322 - 335.4	7250 - 7750	
12.51975 - 12.52025	399.9 - 410	8025 - 8500	
12.57675 - 12.57725	608 - 614	--	

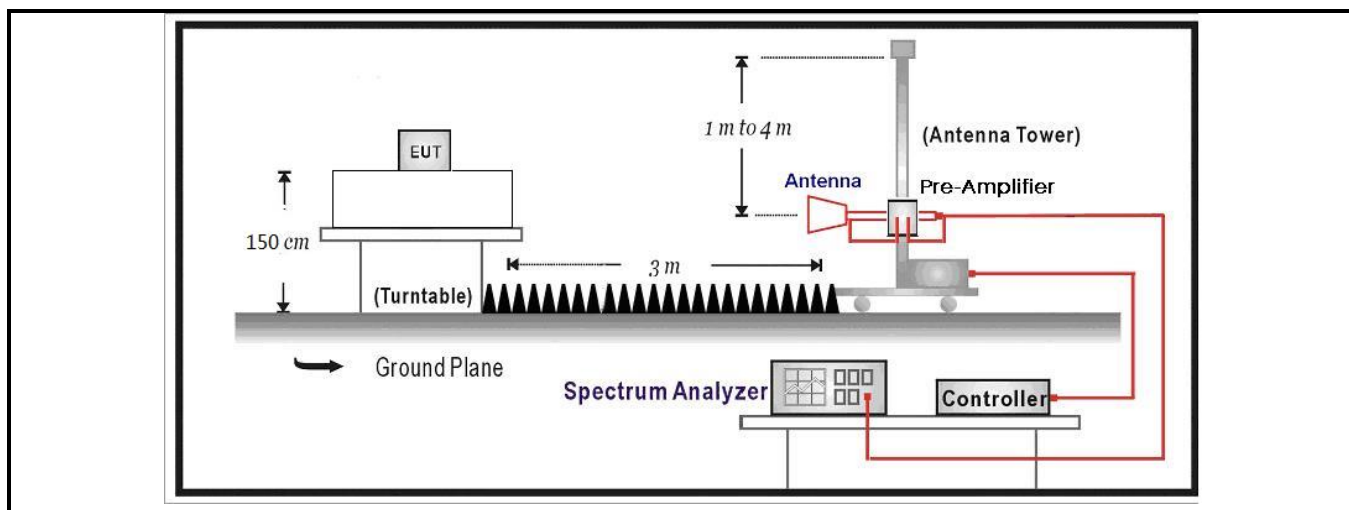
Restricted Band Emissions Limit

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

Test Configuration



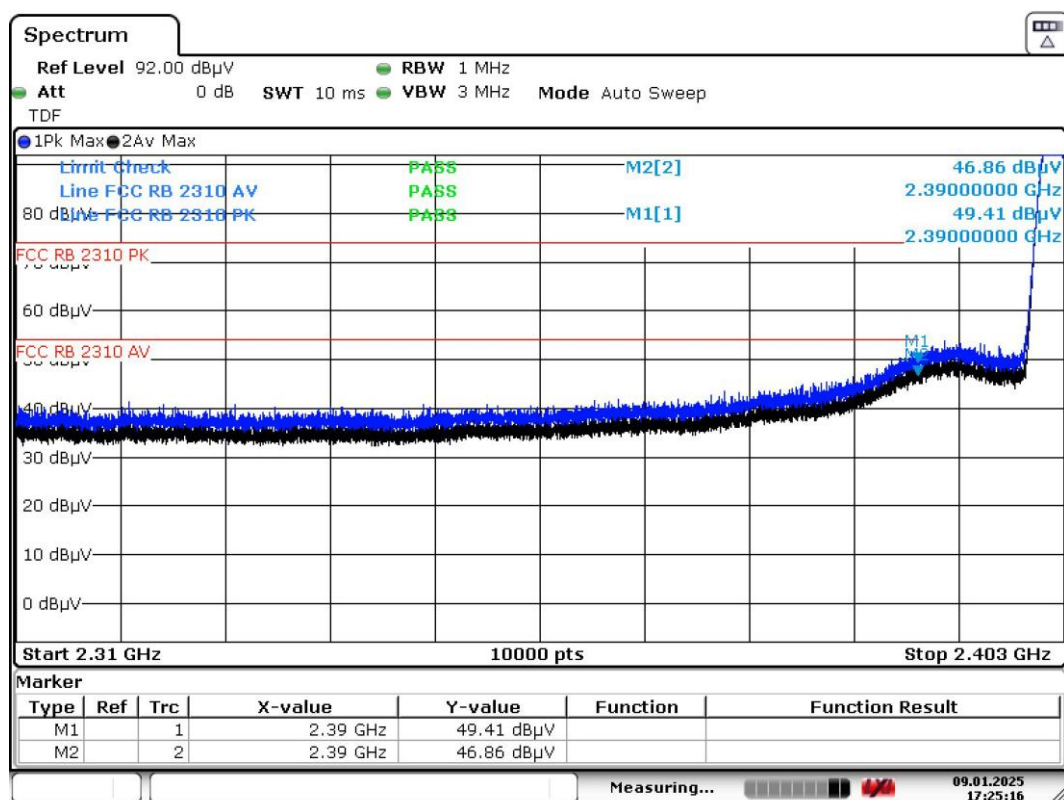
Performed measurements

Port under test	Enclosure port	
Test method applied	<input type="checkbox"/>	Conducted measurement
	<input checked="" type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

Model	MWB-S-F13
Operation Mode (worst case)	Mode 1 @2402 MHz
Test voltage	5 Vdc

Results

Horizontal

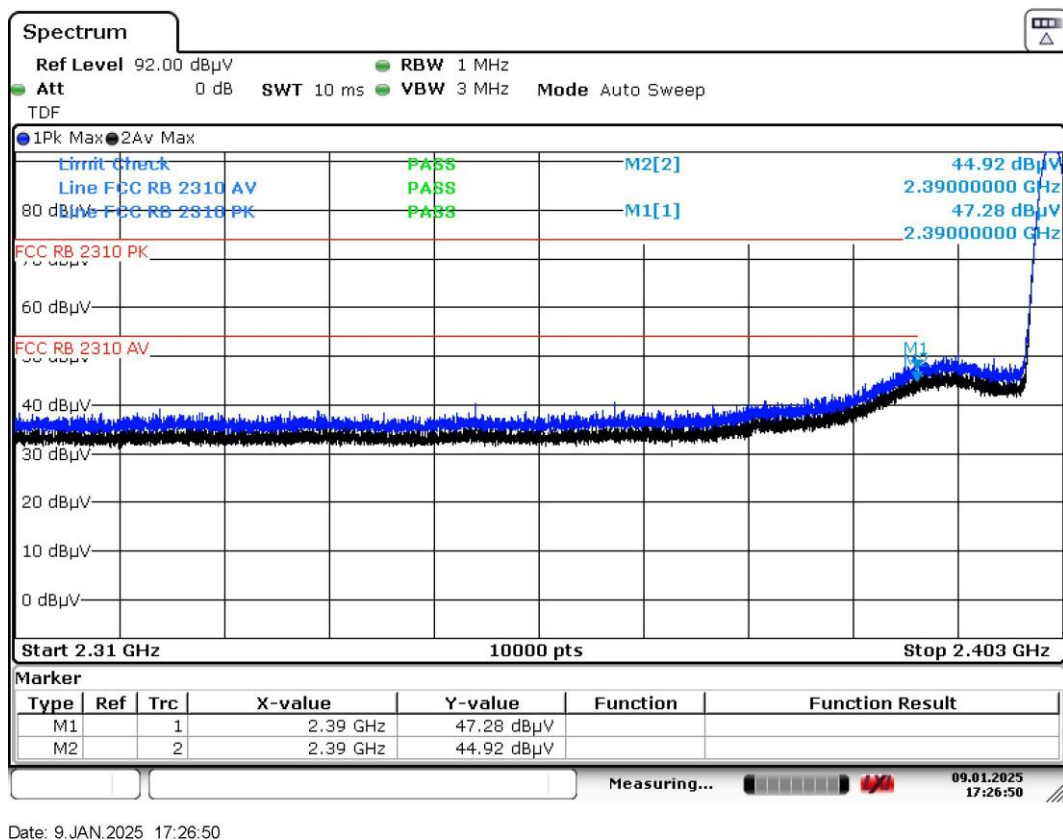


Date: 9.JAN.2025 17:25:16

Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



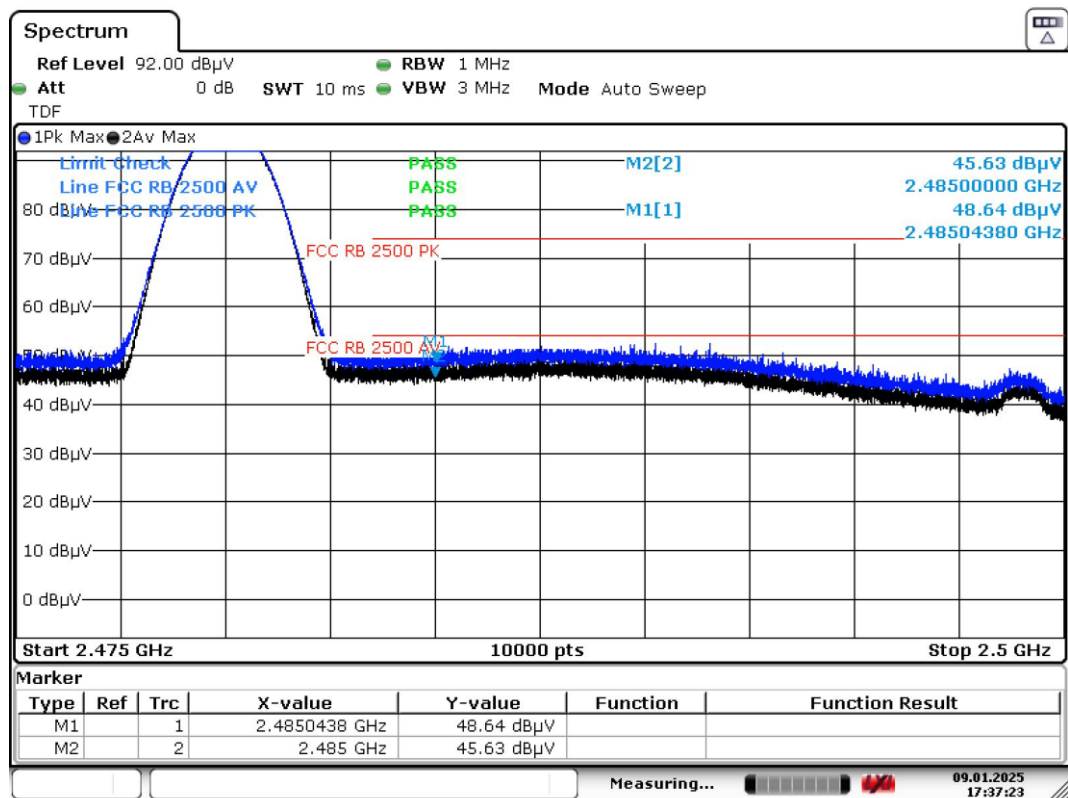
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Model	MWB-S-F13
Operation Mode (worst case)	Mode 1 @2480 MHz
Test voltage	5 Vdc

Results

Horizontal

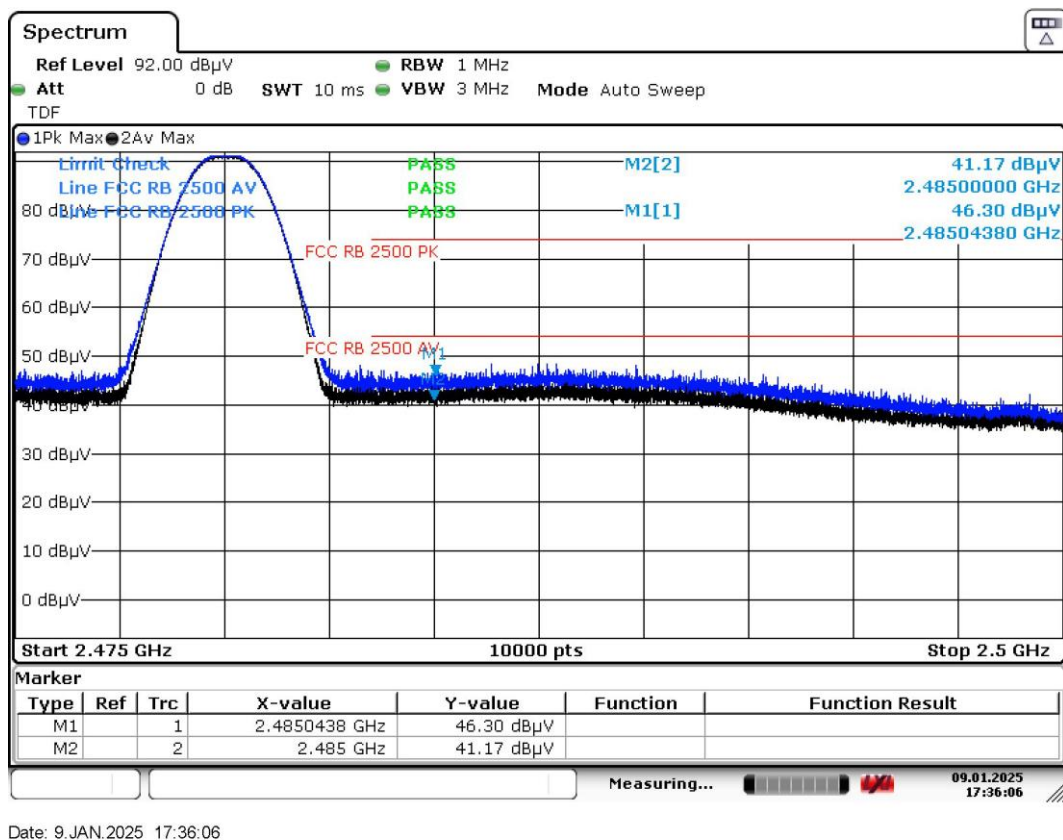


Date: 9.JAN.2025 17:37:23

Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



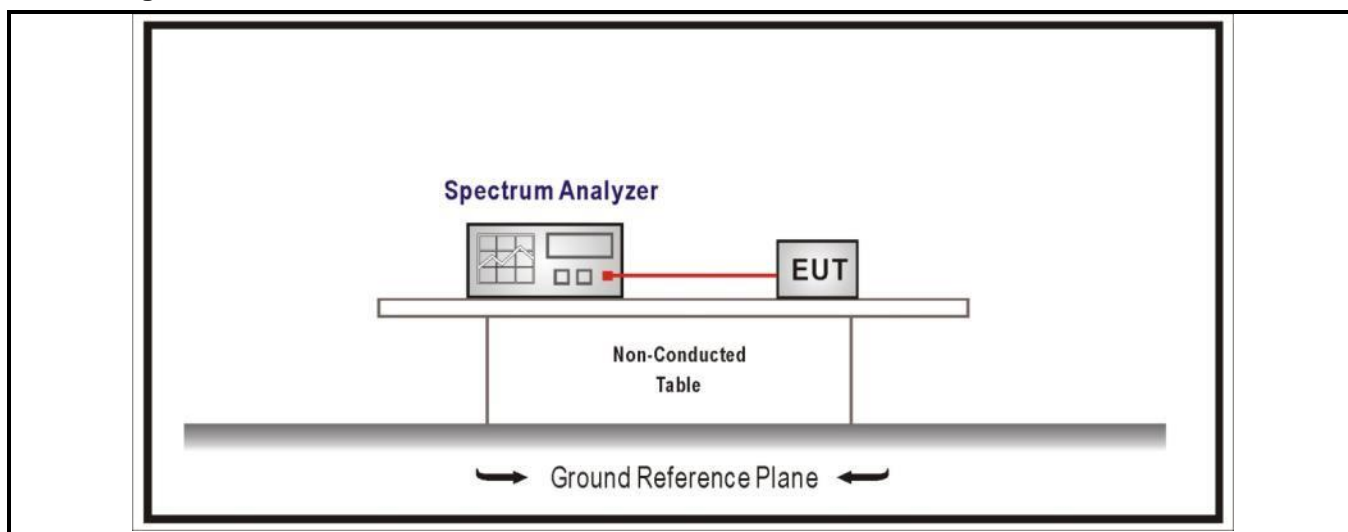
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

4.4 Band Edge	VERDICT: PASS
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Standard	FCC Part 15 Subpart C Paragraph 15.247(d)	
RF Output power (Detection methods)	Limit(dB)	
RF Output power(Average detector)	30dBc(Note1)	
RF Output power(PK detector)	20dBc(Note2)	
Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at by LEast 30 dB relative to the maximum in-band peak PSD by LLevel in 100 kHz (i.e., 30 dBc).		
Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at by least 20 dB relative to the maximum in-band peak PSD by level in 100 kHz (i.e., 20 dBc).		

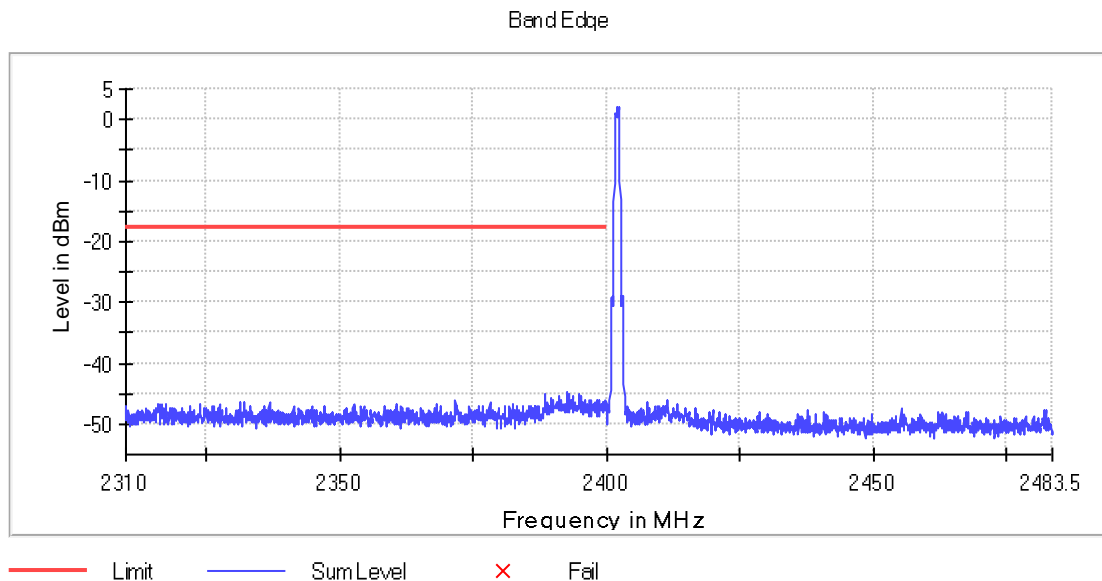
Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

Results of mode 1 @2402 MHz



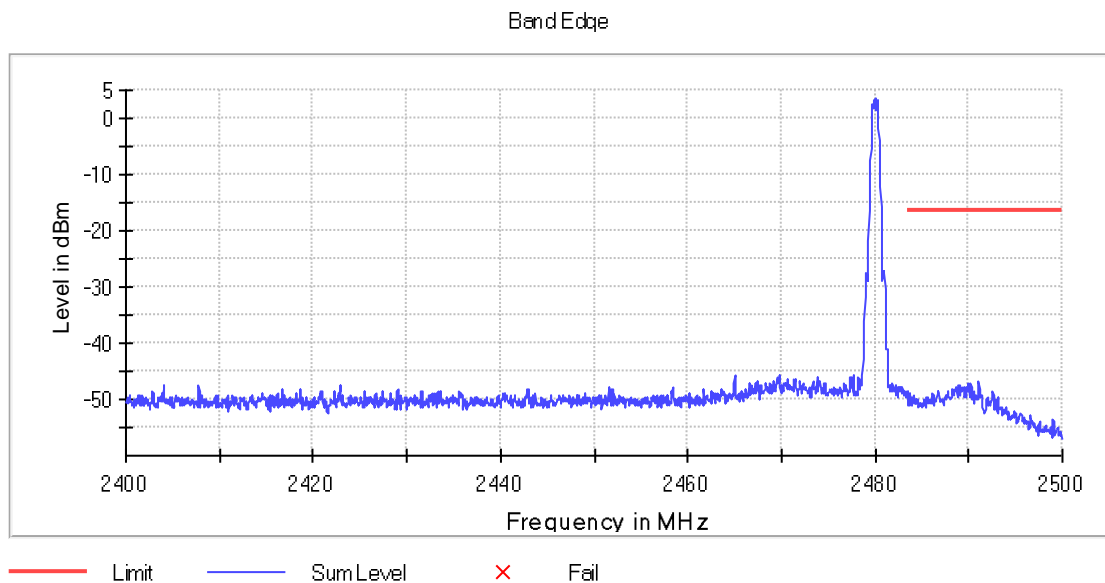
Inband Peak

Frequency (MHz)	Level (dBm)
2402.0000	2.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2392.625000	-44.9	27.0	-17.9	PASS
2388.525000	-45.1	27.2	-17.9	PASS
2392.975000	-45.3	27.4	-17.9	PASS
2394.975000	-45.3	27.4	-17.9	PASS
2392.575000	-45.3	27.4	-17.9	PASS
2393.625000	-45.4	27.6	-17.9	PASS
2395.225000	-45.5	27.6	-17.9	PASS
2391.025000	-45.6	27.7	-17.9	PASS
2393.575000	-45.7	27.8	-17.9	PASS
2392.925000	-45.8	27.9	-17.9	PASS
2388.475000	-45.8	27.9	-17.9	PASS
2394.925000	-45.8	27.9	-17.9	PASS
2389.625000	-45.9	28.0	-17.9	PASS
2395.175000	-45.9	28.0	-17.9	PASS
2390.075000	-45.9	28.0	-17.9	PASS

Results of mode 1 @2480 MHz



Inband Peak

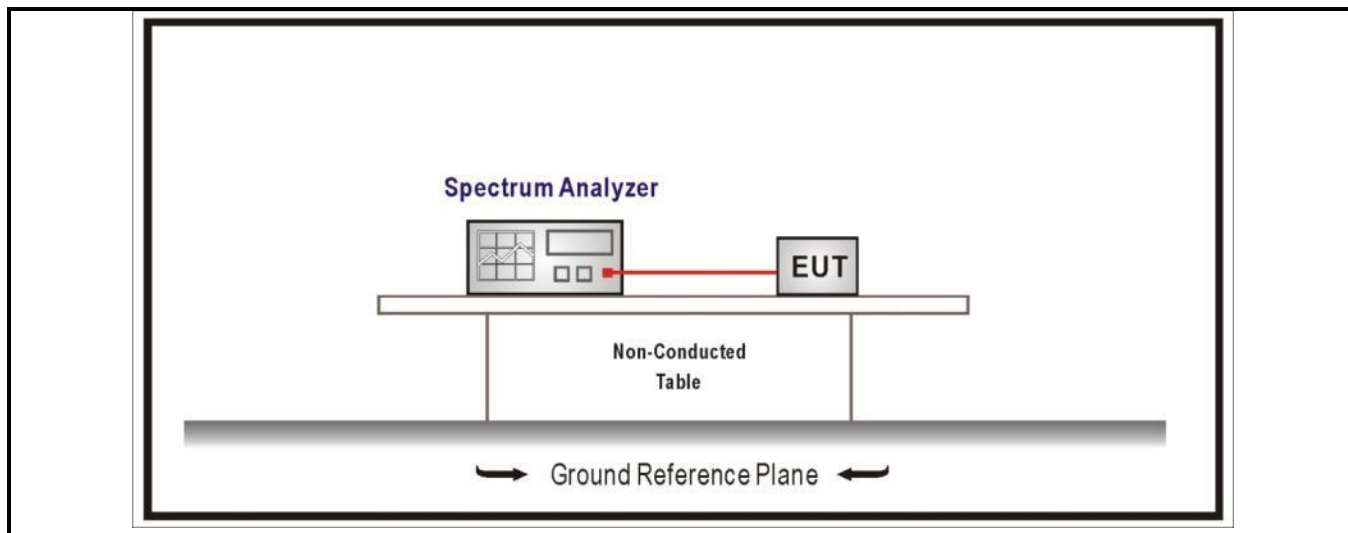
Frequency (MHz)	Level (dBm)
2480.0000	3.5

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2491.025000	-46.8	30.3	-16.5	PASS
2491.075000	-46.9	30.4	-16.5	PASS
2490.025000	-47.0	30.5	-16.5	PASS
2489.975000	-47.1	30.6	-16.5	PASS
2490.225000	-47.3	30.8	-16.5	PASS
2490.175000	-47.4	30.9	-16.5	PASS
2488.975000	-47.5	31.0	-16.5	PASS
2488.925000	-47.5	31.0	-16.5	PASS
2489.475000	-47.8	31.3	-16.5	PASS
2489.775000	-47.9	31.5	-16.5	PASS
2490.275000	-47.9	31.5	-16.5	PASS
2488.675000	-47.9	31.5	-16.5	PASS
2489.375000	-48.0	31.5	-16.5	PASS
2489.325000	-48.0	31.5	-16.5	PASS
2491.175000	-48.1	31.6	-16.5	PASS

4.5	Duty cycle	VERDICT: PASS
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Test Configuration



Performed measurements

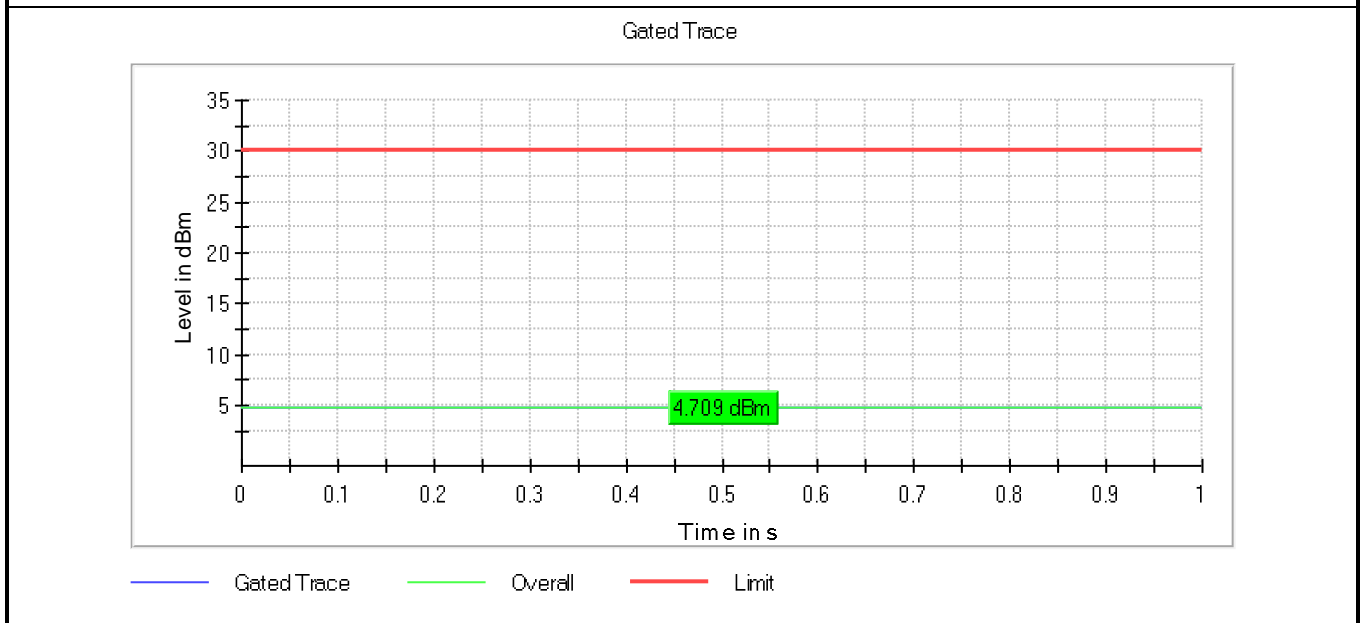
Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

Results

Test Mode	Tx On (ms)	Tx On + Tx Off (ms)	Duty Cycle
Mode 1	---	---	100%

Note 1: T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control Level for the tested mode of operation.

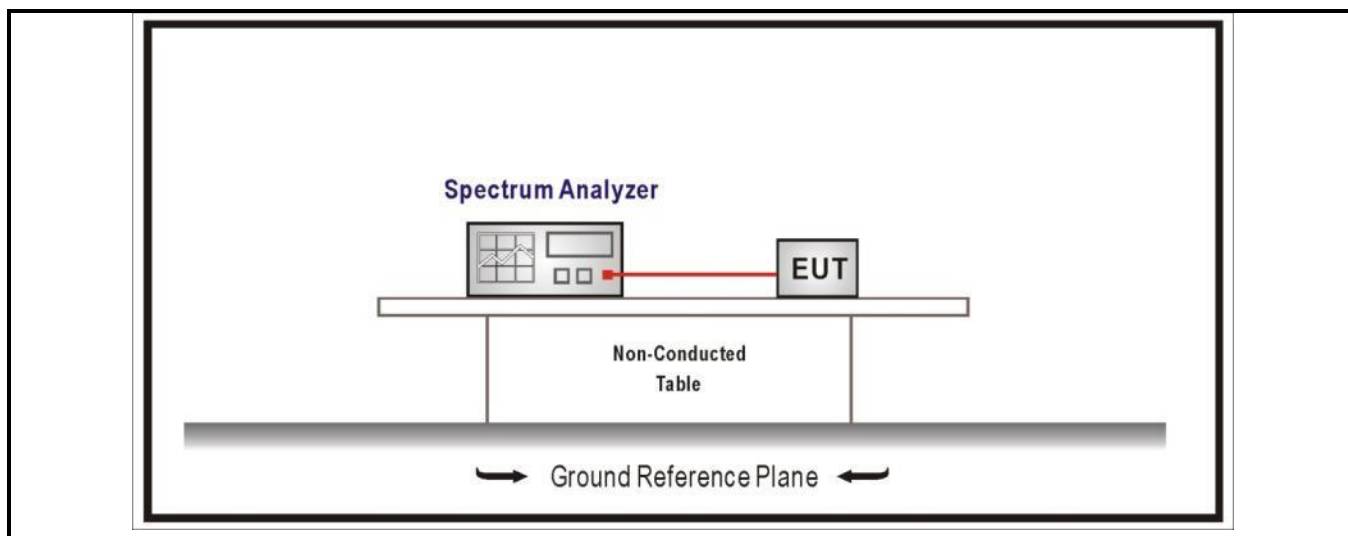
Note 2: According to KDB 558074, when test for Radiated Emission Band Edge and Radiated Emission, for average detector set: VBW $\geq 1/T$ will be used.



4.6 DTS Bandwidth	VERDICT: PASS
--------------------------	----------------------

Standard	FCC Part 15 Subpart C Paragraph 15.247 (a)(2)
Systems using digital modulation techniques operate in the 2400-2483.5 MHz .The minimum 6 dB bandwidth shall be at by least 500 kHz	

Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

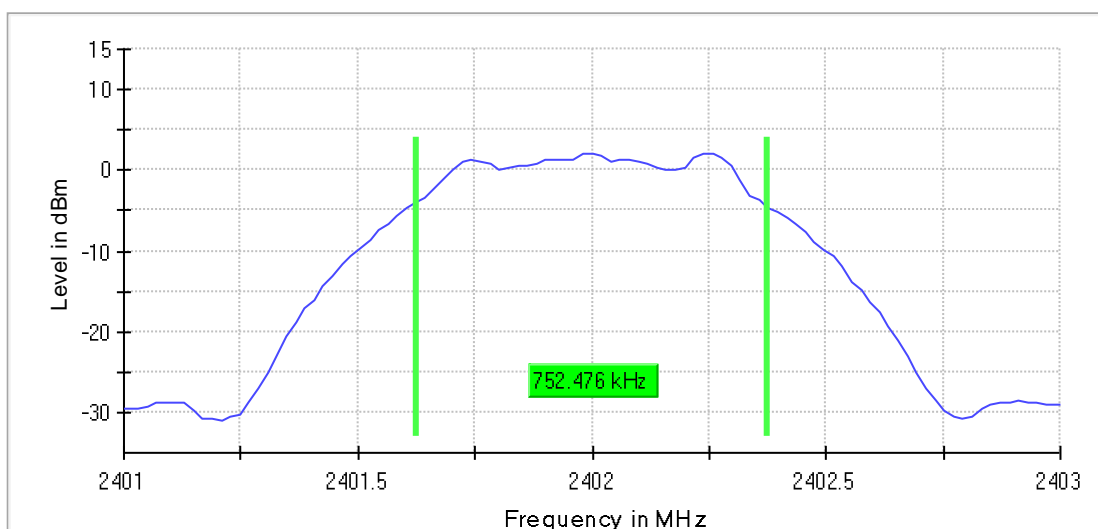
Results

Mode	CH.	Test Freq. (MHz)	6dB Occupied Bandwidth(kHz)	RBW(kHz)/VBW(kHz)	Limit (kHz)	Result
1	0	2402	752.48	100/300	>500	Pass
	19	2440	772.28		>500	Pass
	39	2480	772.28		>500	Pass

6dB Occupied Bandwidth

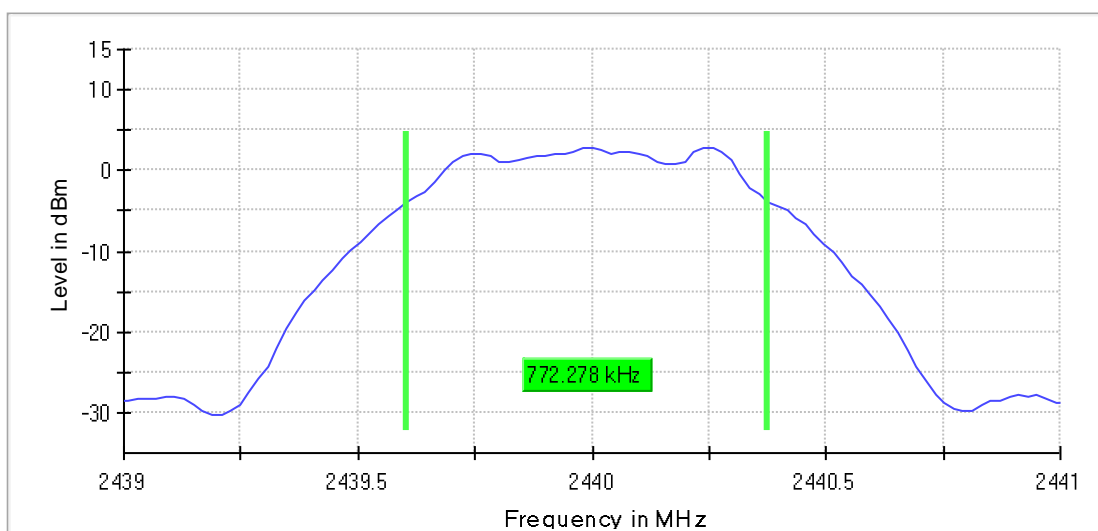
Mode 1 / CH1 (2402MHz)

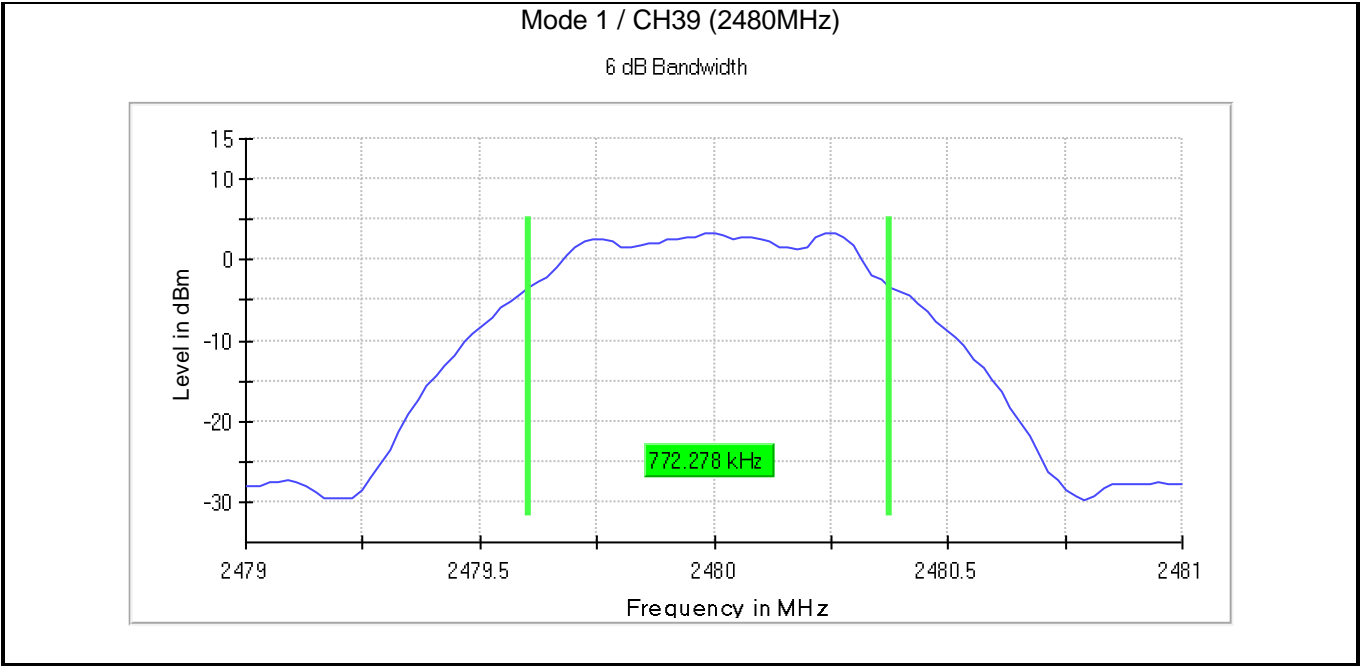
6 dB Bandwidth



Mode 1 / CH19 (2440MHz)

6 dB Bandwidth



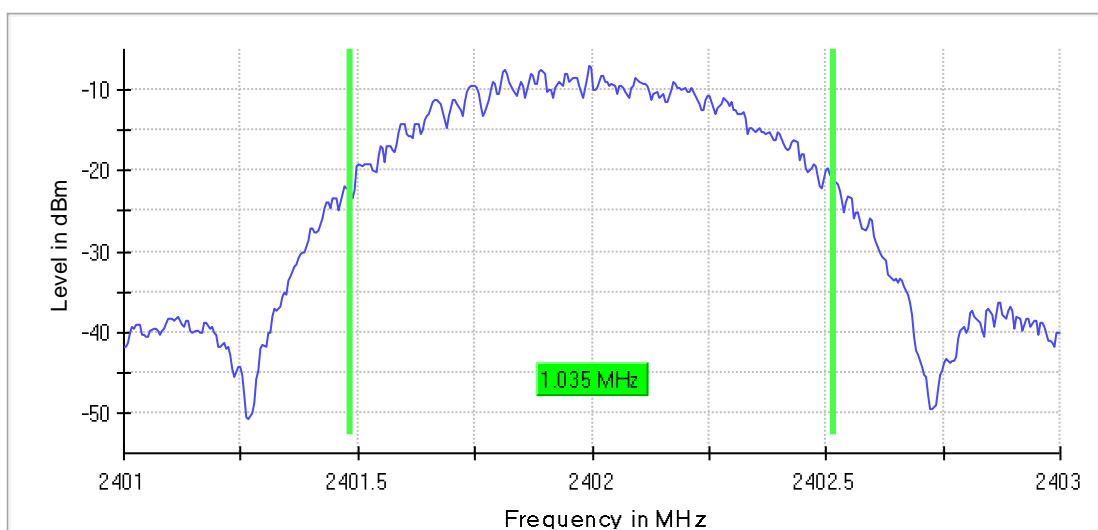


Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	RBW(kHz)/VBW(kHz)	Limit	Result
1	0	2402	1.035	10/30	Within frequency range	Pass
	19	2440	1.035		Within frequency range	Pass
	39	2480	1.035		Within frequency range	Pass

99% Occupied Bandwidth

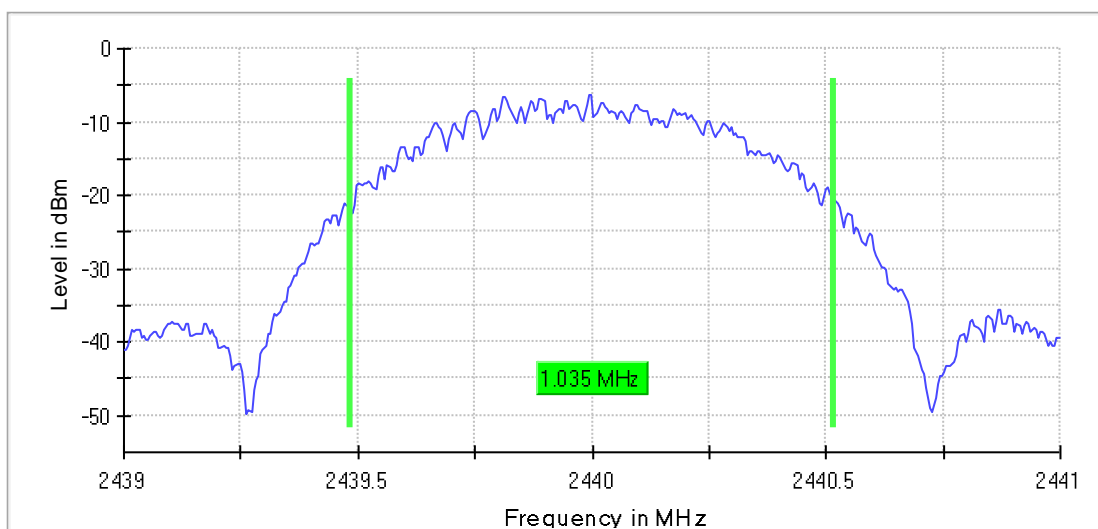
Mode 1 / CH1 (2402 MHz)

99 %Bandwidth



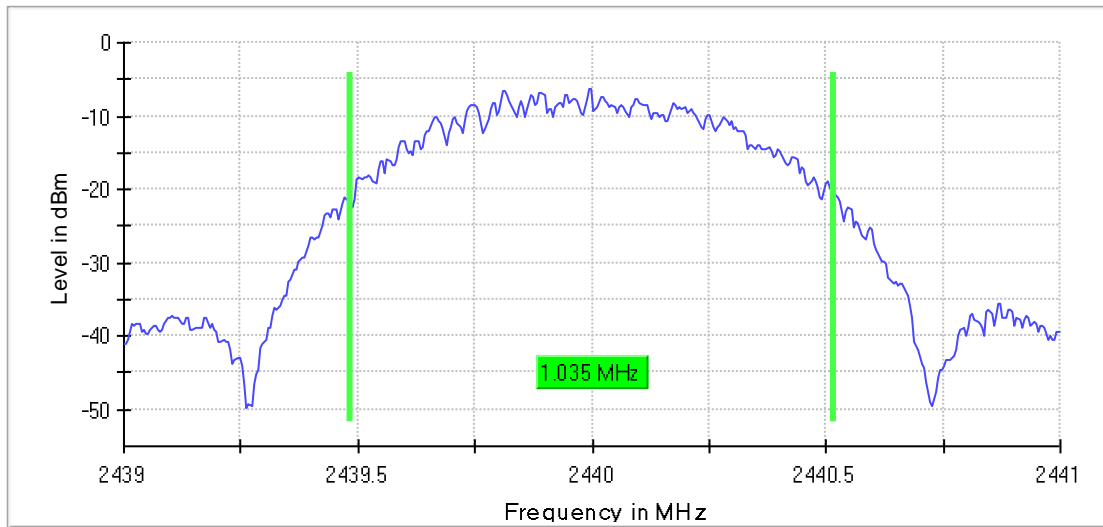
Mode 1 / CH19 (2440 MHz)

99 %Bandwidth



Mode 1 / CH39 (2480 MHz)

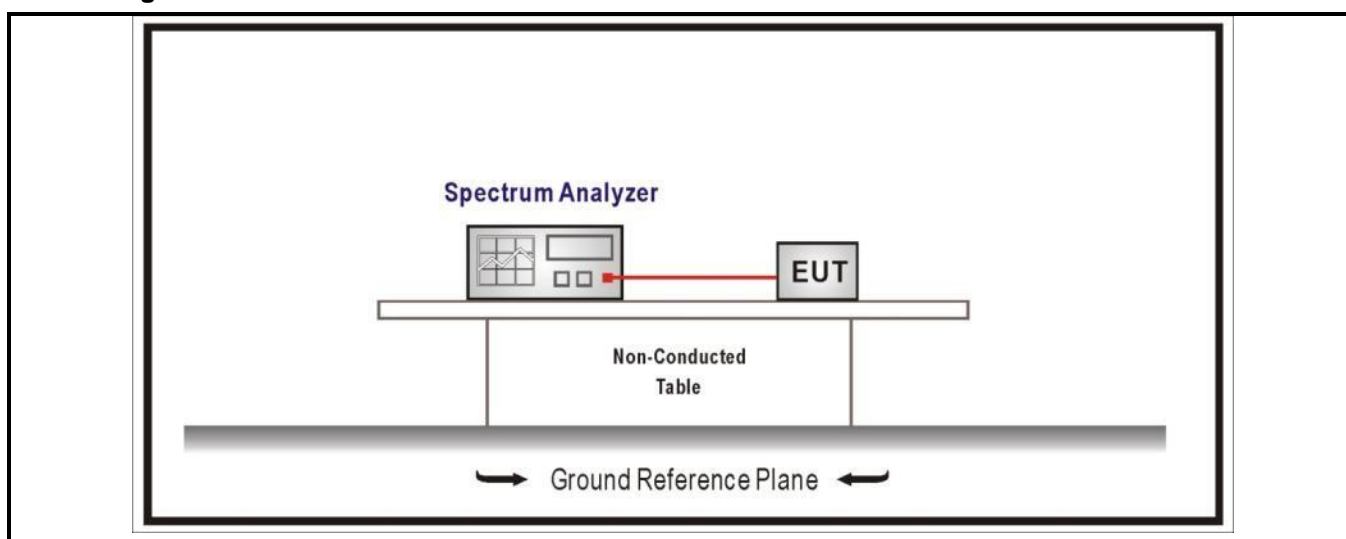
99 % Bandwidth



4.7	Fundamental emission output power	VERDICT: PASS
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Standard		FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
<input checked="" type="checkbox"/>	GTX < 6dBi	Pout≤30dBm
<input type="checkbox"/>	GTX > 6dBi	
<input type="checkbox"/>	Non-Fix point-point	Pout≤30-(GTX -6)
<input type="checkbox"/>	Fix point-point	Pout≤30-[(GTX-6)]/3
<input type="checkbox"/>	Point-to-multipoint	Pout≤30-(GTX-6)
<input type="checkbox"/>	Overlap Beams	Pout≤30-[(GTX-6)]/3
<input type="checkbox"/>	Aggregate power transmitted simultaneously on all beams	Pout≤30-[(GTX-6)]/3
<input type="checkbox"/>	single LE directional beam	Pout≤30-[(GTX-6)]/3+8dB
Note 1 : GTX directional gain of transmitting antennas.		
Note 2 : Pout is maximum peak conducted output power .		

Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

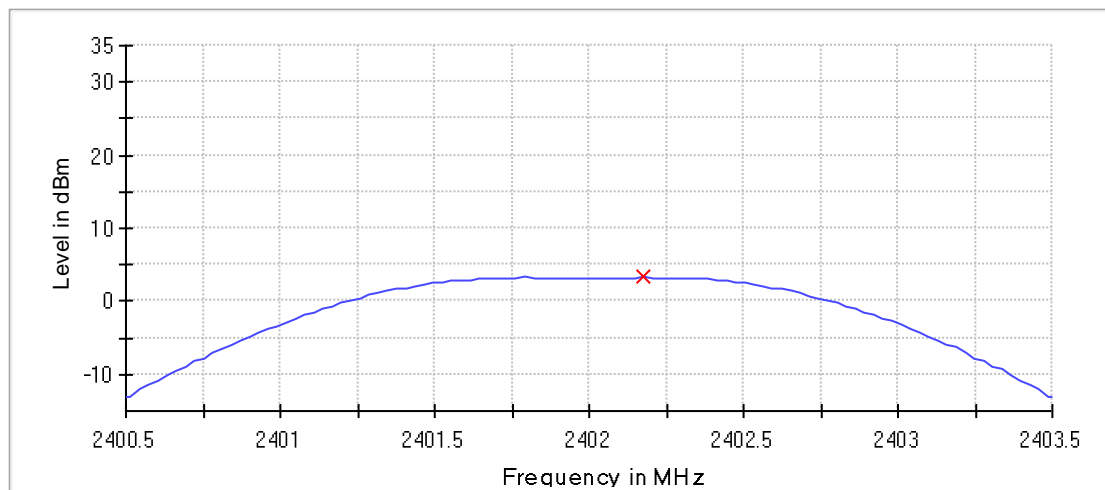
Results

Mode	Channel	Test Frequency (MHz)	RBW(kHz) /VBW(kHz)	Power Output (dBm)	Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
Mode 1	0	2402	2000/2000	3.3	≤30	5.0	≤36	Pass
	19	2440		4.1	≤30	5.8	≤36	Pass
	39	2480		4.6	≤30	6.3	≤36	Pass

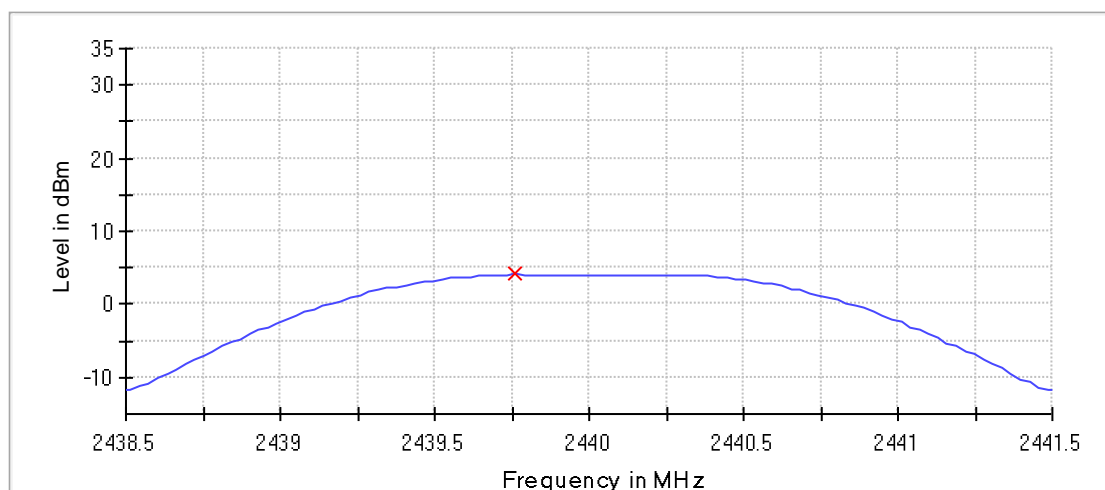
Remark: 1.7 dBi

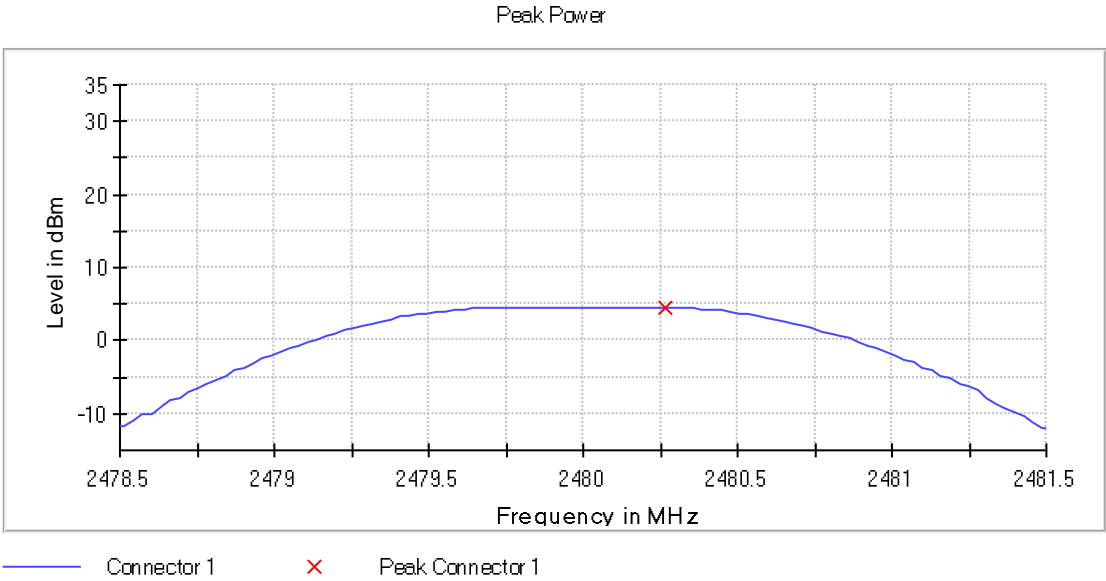
Data of Mode 1

Peak Power



Peak Power

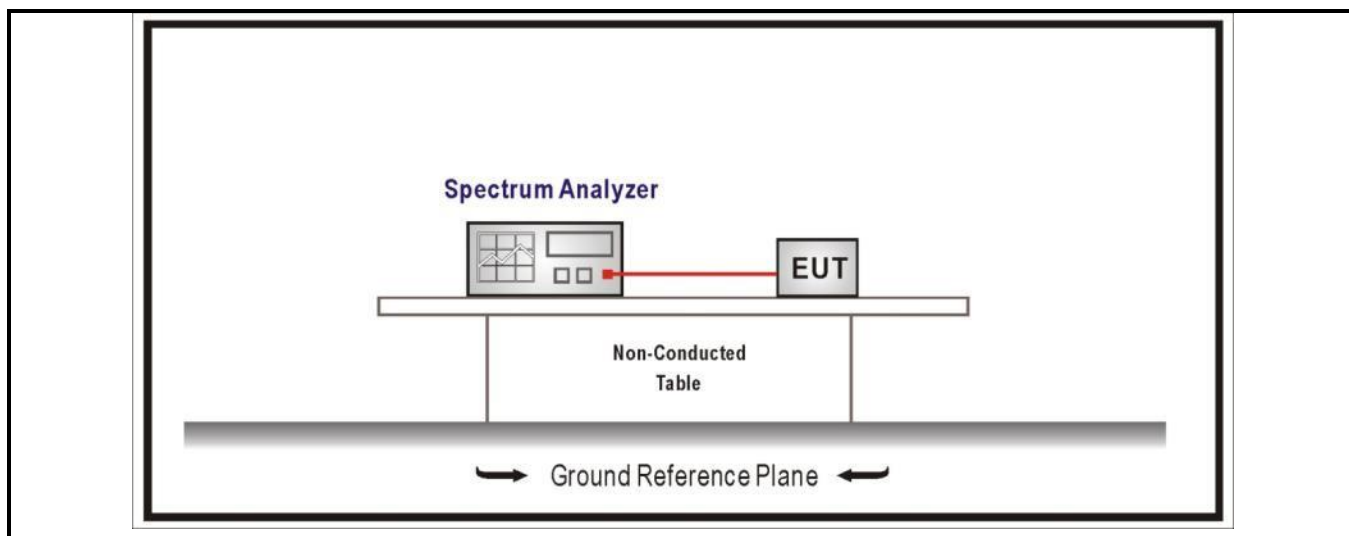




4.8 Power Density	VERDICT: PASS
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Standard	FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
Power Spectral Density $\leq 8\text{dBm}/3\text{kHz}$	

Test Configuration



Performed measurements

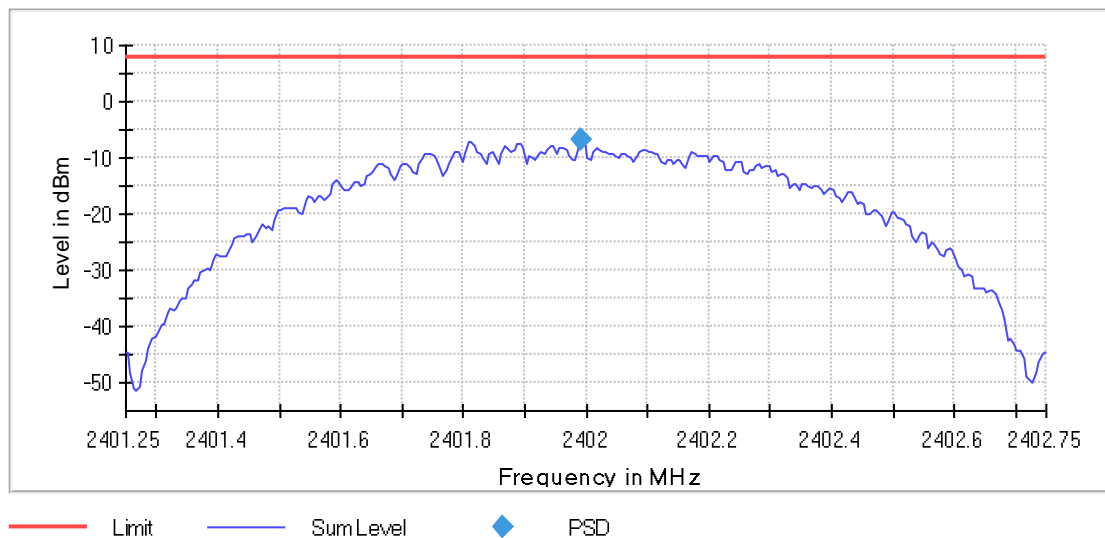
Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

Results

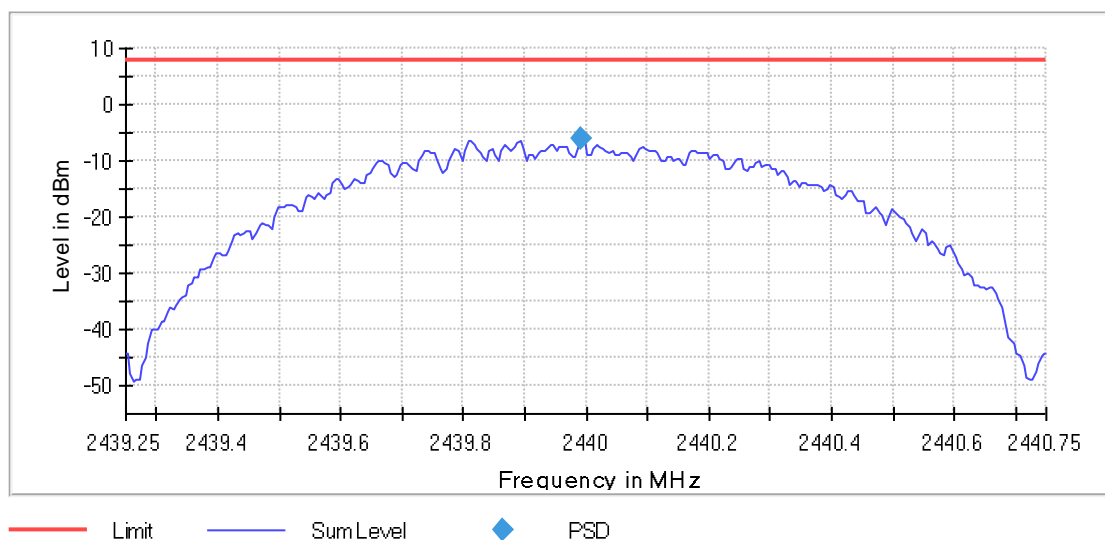
Mode	Channel	Test Frequency (MHz)	RBW(kHz)/VBW(kHz)	Power Output (dBm)	Limit (dBm/3kHz)	Result
Mode 1	0	2402	10/30	-6.78	≤ 8	Pass
	19	2440		-5.99	≤ 8	Pass
	39	2480		-5.58	≤ 8	Pass

Data of Mode 1

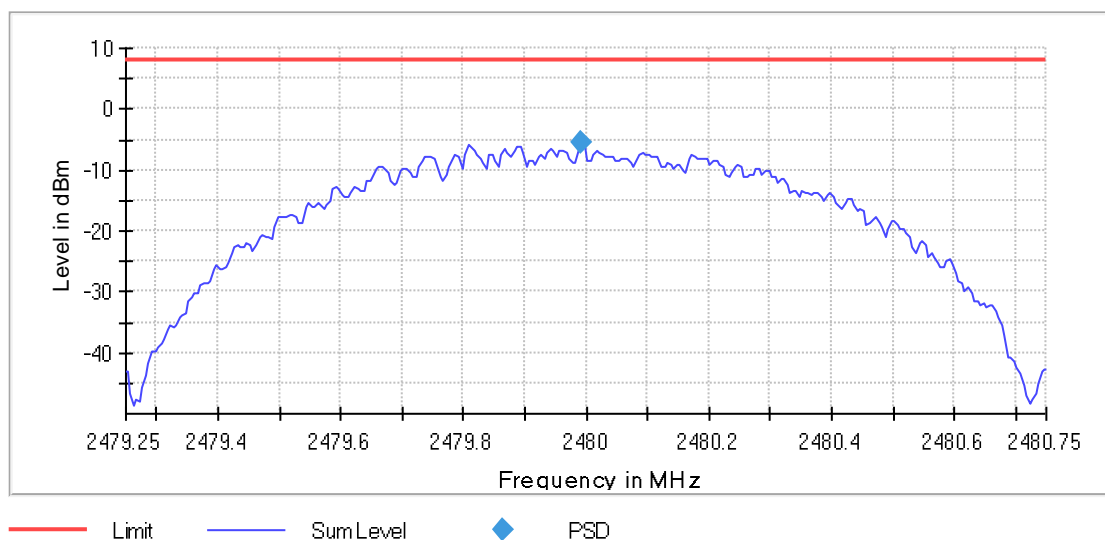
Peak Power Spectral Density



Peak Power Spectral Density



Peak Power Spectral Density



5 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photographs show the tested device.

Refer to documents External photo and Internal photo.

ANNEX 1 – MEASUREMENT UNCERTAINTY

Test Item	Uncertainty
Occupied Channel Bandwidth	$\pm 0,7\%$
RF Output power, conducted	$\pm 0,6\text{dB}$
Power Spectral Density, Conducted	$\pm 0,6\text{dB}$
Unwanted Emissions, Conducted	$\pm 0.7\text{dB}$
Spurious (30-1000MHz)	$\pm 4,4\text{dB}$
Spurious (1-18GHz)	$\pm 4,4\text{dB}$

ANNEX 2 - USED EQUIPMENT

Instrumentation	Manufacturer	Model	Serial no.	DEKRA No.	Cal Due date
Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2025/03/07
Chamber	ETS	/	/	G/L856	2025/02/25
Horn antenna (1GHz-18GHz)	R&S	HF907	102306	G/L1236	2026/02/03
Horn antenna preamplifier	Schwarzbeek	SCU-18	102234	G/L1236-1	2026/02/03
Horn antenna (18GHz-26.5GHz)	ETS	3160-09	00164643	G/L1237	2026/01/09
Horn antenna preamplifier	/	SCU-26D	1879064	G/L1237-1	2026/01/24
EMI receiver	R&S	ESCI	101205	G/L857	2025/06/23
Antenna (30MHz-2GHz)	SCHWARZBECK	VULB9168	01229	GZ2018	2025/03/28
Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2025/06/11
OSP	R&S	OSP 150	101907	GZ1894	2026/02/01
Signal generator	R&S	SMB 100A	181317	GZ1895	2026/02/01
Vector signal generator	R&S	SMBV100A	263671	GZ1896	2026/02/01
Wireless connectivity tester	R&S	CMW 270	100990	GZ1893	2026/02/01
Manual step attenuator (11dB)	Keysight	8494B	TH60074118	GZ2086	2025/08/20
Manual step attenuator (70dB)	Keysight	8495D	TH60074471	GZ2087	2025/08/20
Band filter	HX Microwave	HXLBQ- DZA118	23110101-2	GZ2540	2025/11/26
Band filter	HX Microwave	HXLBQ- DZA104	23110101-1	GZ2541	2025/11/26
Band filter	HX Microwave	HXLBQ- DZA219	23080804-1	GZ2464	2025/08/18
RMI artificial antenna	/	/	/	GZ1988	2025/03/24
Programmable Temperature & Humidity Chamber	ASTUOD	TT-5166	52689	GZ2209	2025/04/08
Test software	R&S	EMC32	---	---	Version 11.30.00

ANNEX 3 - TEST PHOTOS

Refer to document Test setup.

--- END ---